

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of claims:

1. (previously presented) A computer assisted, non-radiological method of intra-operatively measuring and assessing relative geometric relationships among skeletal features of a hip joint, suitable for surgical navigation of a hip arthroplasty operation, comprising the steps of:

touching, with a trackable probe, at least three superficial points corresponding to respective recognizable anatomic features of the pelvis and tracking said probe with a locating system;

processing the tracking data for said trackable probe with software executable on a computer so as to define a pelvic plane without reference to previously obtained radiological data;

tracking with said locating system the orientation of an acetabular implant tool which is coupled to an acetabular implant, to obtain acetabular implant orientation data;

adjusting said acetabular implant into a desired orientation with respect to said defined pelvic plane, without reference to previously obtained radiological data, by relating said acetabular implant orientation data to said defined pelvic plane;

touching, with a trackable probe, at least three points on said acetabular implant and tracking said probe with said locating system;

based on the tracked locations of said at least three points on said acetabular implant, calculating an orientation of said acetabular implant; and

comparing the calculated orientation of said acetabular implant to said desired orientation to verify proper orientation of the acetabular implant.

2. (canceled)

3. (previously presented) The method of claim 1, wherein said anatomical pelvic features comprise at least three of an ipsilateral anterior superior iliac spine, a contralateral anterior superior iliac spine, an ipsilateral pubic tubercle, and a contralateral pubic tubercle.

4. (previously presented) The method of claim 1, further comprising the steps of:
fixing a trackable marker having at least three optical tracking references on the pelvic bone,
defining a pelvic marker reference system without reference to previously obtained radiological data, associated with said pelvic marker;
determining a relationship between said pelvic marker reference system and said pelvic plane; and
tracking said pelvic plane by (a) tracking said reference marker with said locating system, and (b) applying a transformation to compensate for the determined relationship between said reference marker and said pelvic plane.

5. (currently amended) A computer-assisted method of determining changes between pre-operative and post-operative relationships between a femur and a pelvis, suitable for use during a hip arthroplasty operation, comprising the steps of:
maneuvering the femur into a natural reference position;
securing a trackable marker having at least three optical tracking references to the femur by gripping the femur without penetrating through the outer cortical shell of the femur;
touching, with a trackable probe, at least three superficial points corresponding to respective recognizable anatomic features of the pelvis and tracking said probe with a non-radiological locating system;
processing the tracking data for said trackable probe with software executable on a computer so as to define a pelvic plane without reference to previously obtained radiological data;
measuring, by optically tracking said trackable marker with said non-radiological locating system, pre-replacement femoral parameters in relation to the pelvis;
after implanting a prosthetic, returning the femur to said natural reference position;
again measuring, by optically tracking said trackable marker with a non-radiological locating system, post-replacement femoral parameters in relation to the pelvis; and
comparing said pre-replacement and said post-replacement parameters in a computer model.

6. (previously presented) The method of claim 5, wherein said trackable marker is secured to said femur by a clamp mounting said trackable marker.

7. (previously presented) The method of claim 5, wherein said step of attaching a trackable marker comprises:

positioning a collar over the trochanter, said collar bearing an optical tracking target; and
attaching said collar to the femur by a ligature about the femur, said ligature arranged to pull the collar firmly against the trochanter.

8. (previously presented) A system for measuring and assessing the skeletal geometry of a hip joint during surgery, suitable for surgical navigation of a hip arthroplasty operation, comprising:

a locating system which determines positions and orientations of optically trackable markers without reference to previously obtained radiological data;

a trackable, manual probe for acquiring the positions of pelvic landmarks without reference to previously obtained radiological data by touching, with said trackable, manual probe, at least three superficial points corresponding to respective recognizable anatomic features of the pelvis and tracking said probe with said locating system;

a computer, interfaced to said locating system to receive tracking data, and calculating from said tracking data the positions of tracked objects in relation to a generic computer model of a patient's hip geometry;

a software module, executable on said computer, which defines the patient's pelvic plane from the positions of said at least three pelvic landmarks acquired via said trackable, manual probe and without reference to previously obtained radiological data;

a pelvic tracking marker having at least three optical tracking references, fixable to the pelvic bone and optically tracked by said locating system, to track in real time the orientation of said pelvic plane;

a femoral tracking marker having at least three optical tracking references, securely attachable to a femur of the patient and optically trackable by said locating system to detect changes

in leg length and femoral offset; and

a non-penetrating means for securing said femoral tracking marker to the femur of the patient.

9. (cancelled)

10. (previously presented) The system of claim 8, further comprising a trackable acetabular navigation tool, capable of fixation to an acetabular shell implant;

and wherein said software module calculates the relationship between said navigation tool and a real time orientation of said pelvic plane, and displays said relationship, to facilitate establishing proper geometry of said shell implant during surgery.

11. (previously presented) The system of claim 8, wherein said software module defines said pelvic plane from at least three and not more than four pelvic landmarks.

12. (previously presented) The system of claim 10, further comprising an trackable, manual probe for touching to at least three points on said acetabular implant, said locating system arranged to track said trackable, manual probe,

said system arranged to calculate an orientation of said acetabular implant based on the locations of said at least three points on said acetabular implant and to compare the calculated orientation of said acetabular implant to a desired orientation to verify proper orientation of said implant.